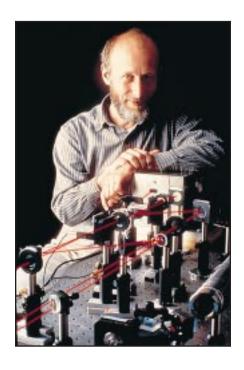# OPTICAL SWITCH PUSHES THE DATA ENVELOPE

*An optical switch that transports many more bits of data per second will pave the way for speedier Internet connections and movies-on-demand.*

Everything carried on optical fiber, whether a phone call, a data file, or video, starts out as electrical impulses. Before these impulses can enter the fiber, they must be converted to optical form. Today, that conversion is done at the local phone company office, using a costly computer—or switch—that modulates a laser so that variations in the light carry the signal. The difficulty comes in separating those different messages to deliver them to their ultimate destination.

Templex Technology Corporation (Eugene, OR) has developed an optical switch that can make this transfer more quickly, increasing the speed of communications. Called SmartSwitch, this technology operates up to 100 times faster than current switches, making it possible to route the equivalent of 500 complete sets of the *Encyclopedia Britannica* in 1 second. This speed increase will save time and money for people and businesses that frequently rely on the Internet as a source of information. Immediate benefits could include cheap two-way videoconferencing and the delivery of movies-on-demand to the home.

**Superfast routing.** Underlying SmartSwitch technology are unique proprietary encoder/decoder devices that generate and detect ultrahigh-speed optical data packets. The encoding device uses a form of code division multiple access (CDMA) to transmit groups of data bits through multiple channels on a single fiber, with each bit assigned a unique sequence code. These data bits are then funneled through a decoder device, which either continues transmitting them along each channel or selectively reroutes them to new destinations. BMDO's SBIR program funded the development of SmartSwitch technology for new high-speed, all-optical data communications networks.

SmartSwitch optical switching devices are simple in design and cheaper than competing devices. "Templex's CDMA provides multiple communication channels with a single laser source," says Dr. Thomas Mossberg, Templex's chief technology officer. "Competing technologies such as wavelength division multiplexing (WDM) systems, for example, use multiple lasers. In addition, because SmartSwitch uses only one laser, it will be much more reliable than WDM systems."

Templex says there is an enormous potential for SmartSwitch in telecommunications. Telephone and cable TV companies have installed 25 million miles of



■ Pictured above is Dr. Thomas Mossberg, chief technology officer, who believes Templex's optical technology will route data signals faster than current technologies.

fiber-optic cable in the United States and are adding thousands of miles a day. Hundreds of thousands of optical switches are needed to direct traffic on these cables. Templex is discussing potential manufacturing deals with several major telephone companies.

In addition to an optical switching device, Templex is developing an optical dynamic random access memory (ODRAM) product. About the size of a regular 3.5-inch diskette, ODRAM will be capable of providing 100 gigabytes (one billion bytes) of storage capacity with entirely nonmechanical beam steering, resulting in data access times of microseconds (millionths of a second) rather than milliseconds (thousandths of a second) common in magnetic disk storage technology today. It also promises multigigabit-per-second read and write rates.

**Capacious memory.** Templex's ODRAM technology will be faster than traditional semiconductor random access memory (RAM) and have a greater storage capacity than magnetic media or compact disc read-only memories (CD-ROMs). For example, ODRAM will store up to 100,000 bits of information per spot, compared with CD-ROM's 1 bit per spot. Businesses and government agencies that must quickly access reams of small, individual records could benefit from using Templex's technology. Possible users include banks, insurance companies, libraries, the Internal Revenue Service, and the Social Security Administration.

An ODRAM prototype has recently been completed. It stores between 50 and 100 gigabytes of data at a cost ranging from $250 to $500 per gigabyte. Templex is discussing market opportunities with a major data storage system supplier.

In 1995, Templex received start-up funding from Cascadia Pacific Management and the Oregon Technology Development Fund. Recently, the company concluded a venture capital round of financing with a group of prominent U.S.-based high-technology investors, bringing the firm's total capital infusion to over $5 million. "The new capital funding brings not only additional financing to the firm, but also a broad base of knowledge from its new investors that will drastically shorten time lines for development of our products," says Larry Brice, Templex's president.

■ For more information, contact Dr. Thomas Mossberg via telephone at (541) 683-7474 or via E-mail at mossberg@templex.com. You can also visit Templex's Web site at http://www.templex.com.

## What Does It Mean to You?
Optical switches will help reduce traffic bottlenecks along the information superhighway, enabling the Internet to emerge as a full-blown service or utility carrying many types of media.

## What Does It Mean to Our Nation?
Optical switches will speed the creation of Internet commerce, boosting our country's technological edge in the global marketplace.

### Tech Trivia

One of the biggest congestion spikes on the Internet can be attributed to NASA's World Wide Web coverage of which event?

A. The collision of Comet Shoemaker-Levy with Jupiter
B. The landing of a spacecraft on Mars
C. The discovery of ice on the moon
D. The destruction of the space shuttle Challenger

*For the answer, see page 72.*